ABSTRACT OF THE DISCLOSURE

The invention is directed to increasing the time resolution capabilities of a photon counting imaging device. This is achieved by a photon-counting imaging device for single x-ray counting, including: a layer of photosensitive material; an NxM array of photodetector diodes arranged in the layer of the photosensitive material; an NxM array of readout unit cells including an high gain, low noise amplifying elements, one readout unit cell for each photodetector diode; the readout unit cells being controlled by a data processing elements; each readout unit cell comprising an internal data processing elements allowing to assign an output signal representing an amplifyied signal of the electron hole pairs generated by an incident photon or a predetermined number of incident photons in the respective photodetector diode to a preselectable region of interest; and the assignment of the output signal is accompanied by a time stamp generated by a clock means.